

REMARKS

Amendments to the Specification

Paragraph [0016] of the specification has been amended, as required by the Examiner, to more clearly point out that the disclosed material has a CTE of 5 to 9 pp, /°C. No new matter has been introduced by reason of this amendment.

Summary of Claim Status

Claims 13-15 are added by way of this response. Claims 1-15 are now pending in the present application with claims 1, 10, and 13 being independent. Applicants thank the Examiner for indicating that claims 8-9 and 11-12 recite allowable subject matter. Applicants have incorporated this allowable subject matter into claims 13-14. Applicants have also amended claims 1, 7, 9, and 10.

Section 112 Rejections

The Examiner rejected claims 1-12 under 35 U.S.C. § 112, second paragraph on the basis that the terms "formed together," "recessed region," and "incorporates a capacitor" render the claims indefinite. Applicants have amended the claims to address each of the Examiner's concerns regarding clarity of the claims. However, Applicants respectfully disagree with the Examiner's remarks regarding claim scope of the claims as presented. Specifically, Applicants submit that the amendments set forth in this response merely clarify the claims as originally presented and are, therefore, not narrowing amendments.

Regarding the term "formed together," claims 1 and 10 have been amended to recite the language "formed integrally." Support for this clarification is set forth in paragraph [0013] of the specification. Specifically, paragraph [0013] sets forth "[a]ccording to the invention, a single structure incorporating a cavity area for the die serves as both the support substrate and the stiffener."

Newly added claim 13, however, does not set forth that the perimeter and the substrate are necessarily "formed integrally."

Regarding the "recessed region" term, to address the Examiner's concerns regarding clarity of this aspect of the claims, claims 1 and 10 have been amended to recite that the contacts are "within" the recessed central region.

Regarding the "incorporates a capacitor" term, Applicants have amended claims 9, 10, and 14 to indicate that electrical circuitry or a capacitor is "included" in the peripheral area. Applicants decline to adopt the Examiner's proposed language that would require that the peripheral area "forms a capacitor" because the Examiner's proposed amendment is unnecessarily restrictive. As set forth in paragraph [0016] "because the cavity wall is part of the continuous substrate, it is possible to extend some circuit function into the wall." Accordingly, as taught in the present invention, the perimeter area can include aspects other than a by-pass capacitor.

Therefore, Applicants have amended claim 9 to recite "the raised perimeter includes electrical circuitry. . . ." New claim 15, depends from claim 9 and sets forth the further limitation that the electrical circuitry is a by-pass capacitor.

Applicants submit that each of the claims is now definite and, therefore, respectfully request withdrawal of the section 112 rejections.

Section 102 Rejections

The Examiner rejected claims 1-3 and 5-7 as being anticipated by U.S. Patent No. 6,020,221 to Lim et al. ("Lim"). However, because Lim fails to teach or suggest a substrate and a perimeter "formed integrally," Applicants submit that claim 1 is neither anticipated nor rendered obvious by Lim. Claims 2-9 and 15 depend directly or indirectly from claim 1, and therefore are patentable for at least the same reasons as claim 1. Accordingly, Applicants

respectfully submit that claims 1-9 and 15 are in condition for allowance.

The Examiner rejected claim 10 as being anticipated by U.S. Patent No. 6,608,261 to Bhattacharyya et al. ("Bhattacharyya"). However, nothing in Bhattacharyya teaches or suggests that "the raised peripheral area is formed integrally with the substrate" as set forth in claim 10. Claims 11 and 12 depend from claim 10 and are patentable for at least the same reasons as their base claim. Accordingly, Applicants submit that claims 10-12 are in condition for allowance.

Section 103 Rejections

The Examiner rejected claim 4 as being unpatentable over Lim in view of U.S. Patent No. 6,201,301 to Hoang ("Hoang"). Applicants do not acquiesce to the Examiner's combination of Lim and Hoang with regard to the additional limitations recited in claim 4. Nevertheless, Applicants submit that claim 4 is patentable over Lim in view of Hoang, at least for the reason, as set forth above, that its indirect base claim, claim 1, recites elements neither taught nor suggested by Lim. Applicants further submit that Hoang cannot remedy the deficiencies of Lim. Therefore, applicants submit that claim 4 is patentable at least for the reasons set forth in connection with claim 1.

New Claims

The combination set forth in claim 13 is patentable at least for the reason that the prior art does not teach or suggest the combination of a substrate having a recessed central region surrounded by a raised perimeter, the recessed central region and the perimeter comprising substantially the same material, the recessed central region having a plurality of contacts inside a recess associated with the recessed central region for providing electrical connection, wherein the integrated circuit device and a heat spreader are recessed such that an upper surface of the heat spreader is

planar with an upper surface of the raised perimeter. Claim 14 depends from claim 13. Accordingly, claims 13-14 are in condition for allowance.

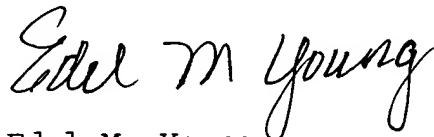
In view of the above amendments and remarks, favorable reconsideration of the pending claims is respectfully requested.

CONCLUSION

In light of the above amendments and remarks, Applicants believe that claims 1-15 are in condition for allowance, and allowance of the application is therefore requested. If any action other than allowance is contemplated by the Examiner, the Examiner is respectfully requested to telephone Applicants' agent at 408-879-4969.

Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached pages are captioned **"Version with markings to show changes made."**

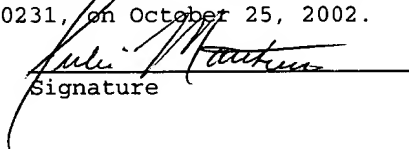
Respectfully submitted,



Edel M. Young
Agent for Applicants
Reg. No. 32,451
408-879-4969

I hereby certify that this correspondence is being deposited with the United States Postal Service as first-class mail in an envelope addressed to: Commissioner for Patents, Washington, D.C. 20231, on October 25, 2002.

Julie Matthews
Name


Signature

VERSIONS WITH MARKINGS TO SHOW CHANGES MADE

SPECIFICATION

Paragraph [0016] is amended as follows:

[0016] Also, as a feature of the invention, because the cavity wall is part of the continuous substrate, it is possible to extend some circuit function into the wall. In particular, plate capacitors in the wall can serve as high frequency bypass capacitors in proximity to the die. The wall of the single unitary structure may include interleaved conductive layers forming one or more chip capacitors for high frequency bypass purposes. When the single unitary structure is formed primarily of material with moderate dielectric constant (and CTE of 5 to 9 ppm/°C) such as ceramic or glass material, conductive and insulating materials may be formed in successive thin layers to create parallel plate capacitors with the ceramic as the dielectric. Placing a capacitor adjacent to the silicon chip provides immediate charge stability to the power and ground voltages experienced by the silicon chip, reducing ground bounce and improving high speed switching characteristics of the integrated circuit device.

CLAIMS

1. (Twice amended) A packaged integrated circuit device comprising:

a substrate having a recessed central region surrounded by a raised perimeter, the recessed central region and the perimeter being formed **[together]** integrally from substantially the same material, the recessed central region having a plurality of contacts within the recessed central region for providing electrical connection from conductors external to the substrate to an integrated circuit device; and

an integrated circuit device formed with contacts on a top surface, flipped, and placed against the recessed central

region of the substrate such that the contacts of the integrated circuit device meet the contacts of the recessed central region of the substrate.

7. (Amended) The packaged integrated circuit device of Claim 6 wherein the heat spreader further contacts the raised perimeter.

9. (Amended) The packaged integrated circuit device of Claim 1 wherein the raised perimeter [~~incorporates~~] includes [a capacitor] electrical circuitry electrically connected to power and ground contacts of the integrated circuit device.

10. (Amended) An integrated circuit package substrate comprising:

a recessed central region having a plurality of contacts for providing electrical contact to an integrated circuit device; and

a raised peripheral area [~~incorporating~~] including at least one by-pass capacitor connected to contacts [in] within the recessed central region, wherein the raised peripheral area is formed integrally with the substrate.